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IS 12473-1 (1988): Chemical Analysis of Hardmetals by Flame  
Atomic Absorption Spectrometry, Part 1: General  
Requirements [MTD 25: Powder Metallurgical Materials and  
Products]

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“Knowledge is such a treasure which cannot be stolen”





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*Indian Standard*

**CHEMICAL ANALYSIS OF  
HARDMETALS BY FLAME ATOMIC  
ABSORPTION SPECTROMETRY**

**PART I GENERAL REQUIREMENTS**

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*Indian Standard*

# CHEMICAL ANALYSIS OF HARDMETALS BY FLAME ATOMIC ABSORPTION SPECTROMETRY

## PART 1 GENERAL REQUIREMENTS

### 0. FOREWORD

**0.1** This Indian Standard (Part 1) was adopted by the Bureau of Indian Standards on 23 September 1988, after the draft finalized by the Powder Metallurgical Materials and Products Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** Chemical analysis of hardmetals by flame atomic absorption spectrometric methods is covered in the following parts:

*Percent Range of  
Each Element (m/m)*

Part 1 General requirements	—
Part 2 Determination of calcium, potassium, magnesium and sodium	0.001-0.02
Part 3 Determination of cobalt, iron, manganese and nickel	0.01-0.5
Part 4 Determination of molybdenum, titanium and vanadium	0.01-0.5

Part 5 Determination of cobalt, iron, 0.5-2 manganese, molybdenum, nickel, titanium and vanadium

Part 6 Determination of chromium 0.01-2

**NOTE** — The method for determination of chromium also permits determination of iron, nickel and manganese within the range of 0.01 to 2 percent.

**0.3** In the preparation of this standard, assistance has been derived from ISO 7627/1-1983 'Hardmetals — Chemical analysis by flame atomic absorption spectrometry — Part 1 General requirements', issued by the International Organization for Standardization (ISO).

**0.4** In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960\*.

\*Rules for rounding off numerical values (revised).

### 1. SCOPE

**1.1** This standard (Part 1) specifies the general requirements for the chemical analysis of hardmetals by flame atomic absorption.

### 2. FIELD OF APPLICATION

**2.1** The method is applicable to the following with the elements and ranges as specified in the foreword:

- Carbides of chromium, niobium, tantalum, titanium, tungsten and vanadium;
- Mixtures of these carbides and binder metals;
- All grades of presintered or sintered hardmetals, produced from these carbides; and
- Coated hardmetals, after total removal of coating

### 3. PRINCIPLE

**3.1** The principle of the method involves the dissolution of a test portion and determination of absorbance by flame atomic absorption spectrometry.

### 4. INTERFERING ELEMENTS

**4.1** The effects of interference are minimized by using a similar matrix in test and standard solutions.

### 5. REAGENTS

**5.1** During the analysis, only reagents of analytical grade and distilled water or water of equivalent purity shall be used.

### 6. APPARATUS

**6.1** Ordinary laboratory apparatus and atomic absorption spectrometry apparatus shall be used.

**NOTE 1** — All measurement parameters should be chosen to give optimum sensitivity.

NOTE 2 Single element hollow cathode lamps are recommended. The recommended instrument requirements are shown in the relevant parts of this standard.

## 7. SAMPLING

7.1 If necessary, the sample may be crushed in a mortar made of a material which does not alter the sample composition. If the sample contains lubricant, this shall be extracted before analysis.

NOTE — In case of sintered hardmetals, the method of sampling may be mutually agreed to between the supplier and the purchaser.

7.2 The analysis shall be carried out on at least three test portions.

## 8. PROCEDURE

8.1 The procedure is given in the relevant parts of this standard.

## 9. TEST REPORT

9.1 The test report shall include the following information:

- a) A reference to this standard,
- b) All details necessary for identification of the test sample,
- c) Results obtained,
- d) All the operations not specified in this standard, and
- e) Details of any occurrence which may have effected the results.